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ABSTRACT

This report contains 72 recommendations from the Virginia Governor's Commission on Excellence in Education (1986) that are directed at three major issues in public education: (1) equity in access to education; (2) excellence in the quality of teaching and learning; and (3) connections for linking learners in the state, the nation, and the world. The recommendations for each of these issues are preceded by a brief discussion of the problems involved and some potential solutions, e.g., use of distance learning, instructional computing, interactive teleconferences, and automation to achieve equity in access to education. Each of the recommendations for the 6-year technology programs projected to address these major issues is accompanied by a narrative statement, the issue it addresses, strategies for carrying it out, the projected outcomes, and the responsible entity. (46 references) (GL)

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Six-Year Technology Plan For Virginia

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Virginia Department of Education
Office of Educational Technology *June 1989*

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Six-Year Technology Plan For Virginia

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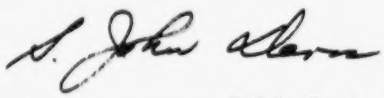
Foreword

The Six-Year Technology Plan for Virginia is based on recommendations made in 1986 by the Governor's Commission on Excellence in Education. The Commission identified disparity in educational opportunities as one of the major obstacles that Virginia must overcome if it is to have one of the best public school systems in the nation. A major goal of **the Six-Year Technology Plan for Virginia** is to reduce disparity in educational programs in public schools in the Commonwealth.

The plan presented in this publication can be achieved through the cooperation of the state and the school divisions and through the development of partnerships with business and industry. Some schools have already accomplished many of the 72 recommendations included in the plan. It is vitally important that all schools and school divisions carry out the recommendations presented in this plan and reap the benefits of educational technology.

Virginia has made a substantial financial commitment to provide school divisions with the equipment and programs students need in this age of technology. This commitment reflects agreement with the statement by The Commission on Excellence that educational technology "must take a central place in public school education."

The Six-Year Technology Planning Committee, which developed this plan, is to be commended for its hard work and its vision and insight into the needs of the public schools and the important role that technology must play in public education. The plan reflects a thoughtful and thorough study of educational technology and how it can be used to meet the needs of students in the Commonwealth. The plan sets the course toward excellence and equity in public education for the present and the future and is designed to be responsive to changes in technology and its use in the public schools.



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Superintendent of Public Instruction

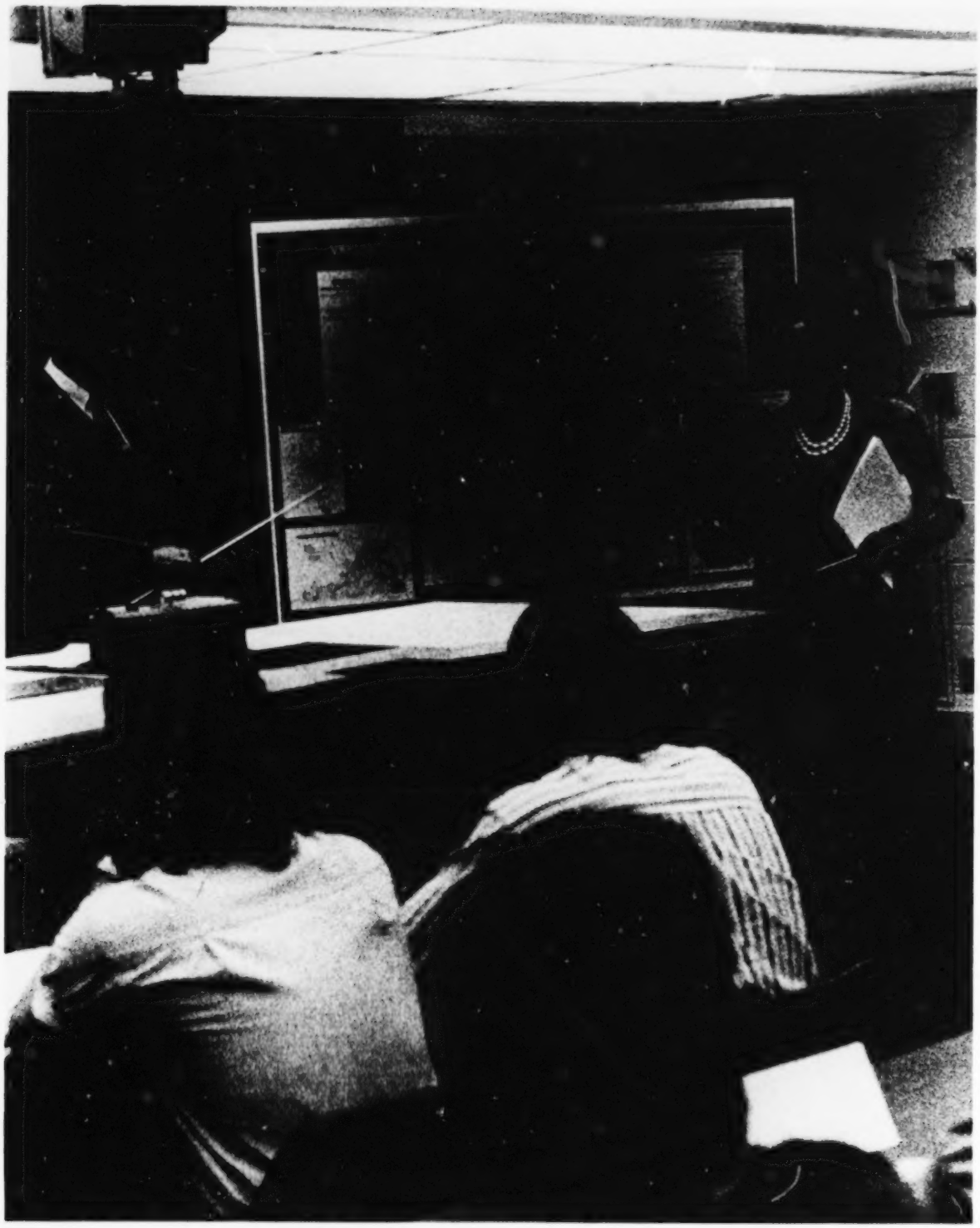


Photo courtesy of the Public Information Office, Henrico County Schools

Introduction

The report of the Governor's Commission on Excellence in Education in 1986 recommended a number of steps to be taken to give Virginia one of the best programs of public education in the nation. One of the major recommendations was that the Department of Education develop a five-year plan to make educational technology an integral part of public education in Virginia. To meet the Commission's challenge, the Department of Education seeks to initiate change by expanding present programs and services in addition to the use of new technologies in education.

Although the Commission proposed a five-year plan for educational technology, the plan recommended in this report covers a period of six years. The longer period of time is proposed to conform to planning programs required of school divisions by the Standards of Quality for Public Schools in Virginia.

As caretakers of information technology in public schools, educators must provide educational systems, knowledge, and opportunities for learning to prepare students for life in the 21st century. Public trust and the mission of education will be compromised if we fail to give our youth adequate tools to help them fulfill their dreams and ambitions. Technology can promote educational excellence, aid instruction, and can be used in evaluating instruction. Balance and growth in the quality and scope of educational programs throughout the state also can be enhanced by the use of technology.

Although satellites, computers, video technologies, networks, and traditional audiovisual media are referred to in the following report, the primary concerns of the committee that developed the Six-Year Technology Plan for the Board of Education are shared by all educators: academic excellence, development of critical thinking and problem solving skills, equality of educational opportunity, staff development, and research in the use of technology in teaching and learning.

"We must put Virginia in the first rank of states in the quality of education."

Governor
Gerald L. Baliles

Schools in Virginia have invested approximately $79 million in technology.

1988
Technology Assessment
Virginia Tech
and State University

"Long-range planning does not deal with future decisions. It deals with the futurity of present decisions."

Peter Drucker

"Educational technology, still a novelty, must take a central place in public school education. This will not happen statewide without state leadership and commitment. For Virginia's educational system to be among the best, it must operate on the cutting edge. Today that cutting edge is educational technology."

Governor's Commission on Excellence in Education, 1986

Technology is the tool and conduit for delivering educational programs. Technology can make education more productive, more relevant, more accessible, and more responsive to learning needs.

Depending upon the student's power to discover, control, and create, learning can be highly individualized through technology. The potential impact of technology upon learning styles may necessitate redefining and restructuring the way that teachers teach and the environments in which students learn. The need for such changes, however, will depend upon the involvement of Virginia's educators in using educational technology.

The ultimate success of technology as an educational tool will depend upon decisions affecting funding, personnel, and training opportunities at state and local levels. Untapped sources of funding may be found in partnerships with business, industry, and educational foundations. While it is true that technology is costly and subject to rapid changes, can we afford not to invest in technology if Virginia is to have one of the best educational programs in the nation?

In developing this report, the Six-Year Technology Plan Committee was assisted by the Communications Automation Transition System (CATS) subcommittee and an industry subcommittee. Before writing the plan, the Committee solicited comments about the use of technology in public schools from professional organizations, teachers, local school consultants, Department of Education staff, the Board of Education, state officials, and community groups. Many of those responses have been included in the plan. A foundation study for the entire plan was the statewide technology assessment conducted by Virginia Tech. The Committee hopes that the Six-Year Technology Plan will serve as a blueprint for future state initiatives in technology and for educational technology programs in public schools throughout Virginia.

This report contains recommendations that are directed at three major issues in public education: equity in access to education, excellence in the quality of teaching and learning, and connections to link learners in Virginia, the nation, and the world. Recommendations, strategies, and outcomes for the six-year technology programs projected to address these major issues are presented in charts following narrative statements on equity, excellence, and connections.

Equity

Disparity and illiteracy were cited by the Commission on Excellence as two major impediments to public education in Virginia. Technology initiatives, currently under way, address four potential solutions to those problems.

The first is distance learning. Distance learning, or the Electronic Classroom in Virginia, refers to one-way video, two-way audio course instruction sent via satellite and open broadcast from a central location to students in other schools. Distance learning via the Electronic Classroom can promote equitable access to education in all schools throughout the Commonwealth, ensure that small rural school divisions can provide educational opportunities equal to those provided by large suburban and urban school divisions, and address instructional needs, including "at risk" and potential drop-out school populations. Teacher shortages, small numbers of qualifying students within a school, inconveniences relating to travel to colleges and universities, and scheduling conflicts are reasons given by students and school administrators for Electronic Classroom program participation.

The second solution is instructional computing. The instructional computing program involves equitable distribution of state-funded equipment and software, and opportunities for teacher training. The initial focus of the instructional computing program is remediation in reading, writing, and mathematics for grade six to meet the needs of at-risk students and potential dropouts. The software and teacher training components will directly relate to the primary focus of the program. Schools will be able to use the computers for other purposes including the teaching of writing across the curriculum, after-school and weekend programs, keyboarding, and for teacher productivity.

The third solution is interactive teleconferences produced to provide current information to all teachers and students. Interactive teleconferencing in Virginia refers to one-way

"Educational Technology — the management of environments for effective learning through appropriate interactions between people, materials and machines."

Visions 2000: A Vision of Educational Technology in Alberta by the Year 2000.
Alberta, Canada, 1987

"Technology can be used to provide programs for schools with vast differences in student achievement and in educational opportunities."

Governor's Commission on Excellence in Education, 1986

"New technologies are making possible imaginative approaches to teaching traditional subjects and are motivating teachers and children to try new ways of information gathering and learning. New learning tools have diverse objectives and effects. This diversity is due, in part to the flexibility of interactive technologies."

Power On! New Tools for Teaching and Learning. Office of Technology Assessment, United States Congress, 1988

video, two-way audio instruction and information sent via satellite and open broadcast from a program origination classroom to classrooms in other locations across the State. Teleconferences are currently being scheduled by the Department of Education in one-hour slots twice weekly. The Department of Education Hour (DOE Hour) as it is called, provides an opportunity for equality in training and for program updates.

The fourth solution is automation. Automated, standardized databases, under development, will address statewide disparity in the management of student information, school finance, instructional personnel data, libraries, and other aspects of school administration. Electronic networks with automated, standardized databases provide interactive links between school divisions with abundant resources and school divisions lacking adequate resources. These networks also can provide access to information by students through a vast array of media formats designed to promote inquiry, critical thinking, and lifelong learning.

The establishment of foundation levels and standards for electronic hardware and software in classrooms and library media centers can also reduce disparity. Each student throughout the Commonwealth should have access to computers, videodiscs, distance learning/electronic classrooms, interactive video technologies, communication networks, online reference service and catalogs, as well as traditional media programs such as instructional television.

It should be emphasized, however, that the provision of technology alone does not reduce disparity. Access to technology will be futile and equipment will lie idle without the guidance of competent, trained teachers. The establishment of foundation levels and standards for inservice and preservice technology training for teachers is essential. Because technology is applicable to all areas of education, continuing programs of staff development that reflect teacher/administrator commitment will foster educational equity.

Through effective implementation, educational technology can expedite and provide equal access to teaching and learning throughout the Commonwealth.

Recommendation:

Develop guidelines for Electronic Classroom/distance learning to serve as a standard for enrollment, utilization, and replication.

Outcomes:

- Electronic Classroom origination and receive schools will have developed guidelines to serve as a standard for enrollment and utilization by 1990.

Issue:

Equity

Goal:

Enhance curriculum and increase access

Responsible Entity:

DOE

Recommendation:

Provide a variety of course offerings through the statewide satellite network from Virginia Electronic Classrooms and from national and/or international distance learning programs.

Outcomes:

- LEA surveys will be conducted on an annual basis to determine course needs and to keep abreast of changing instructional needs of users.
- Course offerings in calculus, English, and Latin will be expanded to include courses with the highest number of requests from school divisions. The largest number of requests for additional courses are in the areas of foreign language, geometry, and computer science. Courses in the less commonly taught languages continue to remain at the top of the list for many schools.
- Electronic Classroom offerings to LEA's will have included Department of Education and local school produced courses by 1990.
- Divisions will be able to receive distance learning courses from other parts of the state and from production sites outside the state via satellite by 1994.
- Middle schools will be equipped to receive Electronic Classroom courses via satellite by 1992.
- Electronic Classroom/distance learning courses will have been expanded to include elementary schools by 1994. A pilot program in Japanese cultures and language, completed in 1988, demonstrated that a need for Japanese exists at the elementary school level and that elementary school students can manage interactive technology effectively.

Issue:

Equity

Goal:

Enhance curriculum and increase access

Responsible Entity:

DOE

Issue:

Equity

Goal:

Establish foundation levels of equipment and programs

Responsible Entity:

DOE and other state agencies

Recommendation:

Provide the following foundation level of equipment for satellite receive classrooms in all schools:

Each trained classroom teacher or facilitator in a receiving classroom should be provided a 25-inch color TV receiver/monitor, a VHS videocassette recorder/player, a programmable speaker telephone, and facsimile equipment that conforms to a state standard.

Outcomes:

- 318 secondary schools with grades 10-12 will have received satellite receive only (c/ku capacity) systems, including a classroom equipped with a 25-inch TV/monitor, programmable telephone, videocassette player/recorder, and facsimile machine to provide an opportunity for participation in the Electronic Classroom and other satellite learning by staff and students by 1990.
- Approximately 425 middle schools will have received satellite receive only (c/ku capacity) systems. Each receive classroom will be equipped with a 25-inch TV/monitor screen, programmable telephone, videocassette player/recorder, and facsimile or microcomputer and modem by 1992.
- A number of the 1,130 elementary schools will have received Electronic Classroom programs. Each receive classroom will be equipped with a 25-inch TV/monitor, programmable telephone, videocassette player/recorder, and facsimile or microcomputer and modem.
- An assessment will be authorized to determine the most effective delivery system for elementary Electronic Classroom courses.
- Public broadcast and satellite will be used, when appropriate, to deliver courses to fully-equipped receive classrooms.

Issue:

Equity

Goal:

Establish foundation levels of equipment and programs

Responsible Entity:

DOE

Recommendation:

Equip each receive classroom with a telephone line dedicated for use by students in schools who can only reach the Electronic Classroom through a long-distance call.

Outcomes:

- Each Electronic Classroom receive and origination site will have installed a telephone line dedicated for interactive communication by 1989.

Recommendation:

Equip each school with a satellite receive only earth station that conforms to a state standard, has C band and KU band receive capability, and has trained personnel to manage the system.

Outcomes:

- All schools will have the necessary equipment to receive the Electronic Classroom and other available satellite programs.
- Training for Electronic Classroom facilitators and system operators will have been conducted by the State Department of Education in cooperation with local schools by 1991.

Issue:

Equity

Goal:

Enhance foundation levels and standards

Responsible Entity:

DOE

Recommendation:

Equip each teaching station in new or renovated schools with an RF TV distribution system and accommodate technological needs in architectural designs.

Outcomes:

- RF TV distribution systems will be recommended to LEAs for all new and renovated schools. Additionally, blueprints will be reviewed to provide advice to architects on designing for technological change.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Recommendation:

Equip each school with locked storage cabinets to ensure safety and negate theft of Television Receive Only (TVRO) satellite classroom hardware.

Outcomes:

- TVRO receive classrooms in schools will be equipped, where possible, with storage cabinets to ensure safety and prevent theft.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Recommendation:

Equip course origination Electronic Classrooms with up-to-date broadcast quality production facilities which include a minimum of three cameras, one camcorder, switcher, mechanical control, audio and time base correction systems, camera and preview monitors, VCRs, electronic graphics generator, video display units for still and motion graphics, computers, microphones, and teleconferencing units.

Outcomes:

- Originating electronic classrooms administered by the state will be equipped with up-to-date production equipment and facilities for multiple production uses.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE

Recommendation:

Equip each classroom in which courses originate with appropriate specialized equipment and materials for lesson design, preparation, and communication.

Outcomes:

- Instructional support equipment and materials such as software, video clips, and computers will be provided annually to originating Electronic Classrooms.
- Program design workshops will be provided for teachers and production staffs in the existing sites on an annual basis.

Issue:

Equity

Goal:

Enhance curriculum and increase access

Responsible Entity:

DOE/LEAs

Recommendation:

Promote the use of adaptive and instructional technology in programs designed for special education, vocational education, and for students who need resources beyond those used in traditional settings.

Outcomes:

- Special and vocational education students, and students in need of resources beyond traditional settings, will have become aware of appropriate adaptive and instructional technology through teachers, and other personnel by 1994.

Recommendation:

Develop the use of interactive teleconferences for students to provide current information that is not included in textbooks, to meet Board of Education mandates, to share new developments in education including science and technology, and to provide equity in the availability of selected courses.

Outcomes:

- Select populations of students will have received current information on science topics, technology, and subjects not addressed in textbooks via interactive teleconferences by 1994.

Issue:

Equity

Goal:

Enhance curriculum and increase access

Responsible Entity:

DOE

Recommendation:

Designate a responsible person in each school division and school to coordinate staff development and applications of technology.

Outcomes:

- The designated person responsible for the coordination of technology applications may be a teacher, administrator, media specialist, or other instructional specialist. The person may be full time or half time.

Issue:

Equity

Goal:

Enhance curriculum and increase access

Responsible Entity:

LEAs

Recommendation:

Identify and distribute to public schools information about the effective use of computers and other technologies in subject areas in the curriculum to help achieve instructional objectives.

Outcomes:

- Local schools will have received updates on effective uses of micro-computers and other technology in instruction from the Department of Education by 1990.
- Updates will be provided annually through newsletters, brochures, the State Technology Conference, and teleconferences.
- The Department of Education will have developed and implemented pilot programs for statewide replication through satellite learning in five school divisions, and a Potomac Edison Microcomputer Project involving ten school divisions by 1994.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Issue:

Equity

Goal:

Provide automation tools

Responsible Entity:

DOE

Recommendation:

Establish guidelines for the automation of management of library media services in all schools.

Outcomes:

- Library media services automation will have been developed through the Department of Education's Communication Automation Transition System (CATS), the Six-Year Plan Committee and other agencies by 1994.
- The Department of Education, in cooperation with schools and other agencies, will have developed guidelines for the automation of library media services by 1994.

Issue:

Equity

Goal:

Provide automation tools

Responsible Entity:

DOE

Recommendation:

Develop automated standardized databases for educational information to support all levels of public education, focusing initially on the following three areas:

a. **Student Information. Develop an integrated student information management database to support the schools, school divisions, and the Department of Education.**

b. **Financial Management. Develop an integrated distributed financial database to support both the Department of Education and school divisions.**

c. **Personnel Information. Develop a standardized teacher/professional database. Certification and endorsement data on all professionals would be stored in the Department of Education for the Department's own use and to be transferred to a school division when needed. Files in the division would be augmented with additional data related to salaries, contracts, and training.**

Outcomes:

- Automated standardized databases for student, financial, and personnel information will have been identified and distributed to all schools in the Commonwealth by 1992.

Recommendation:

Develop or adopt standardized software to support school administration including:

- **Attendance, grade reporting, and scheduling**
- **Budget, general ledger, and payroll**
- **Personnel**
- **Vocational Education**
- **Special Education**
- **Library management**
- **Transportation management**
- **Building maintenance/facilities management**
- **Inventory**
- **School food service**

Issue:

Equity

Goal:

Provide automation tools

Responsible Entity:

DOE

Outcomes:

- Automated databases for administrative purposes will have been expanded to include new administrative programs.

- The Communication Automation Transition System (CATS) will have been expanded by 1994 to include databases to support school administration in the areas of: (a) attendance, grade reporting and scheduling, (b) budget, general ledger, and payroll, (c) personnel, (d) Special Education, (e) Vocational Education, (f) inventory, and (g) transportation management.

Recommendation:

Work cooperatively with Special and Vocational Education to promote the effective use of technology in managing and reporting information on enrollment, transcript transmission services and other required activities.

Issue:

Equity

Goal:

Provide automation tools

Responsible Entity:

DOE

Outcomes:

- The Communication Automation Transition System's (CATS) training program on the use of the technology and databases involves all participants. Some of the training is slated for the 1990-1992 biennium.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE

Recommendation:

Provide a basic level of technology training for all staff in the Department of Education to promote leadership in the use of technology.

Outcomes:

- A basic level of "hands-on" training will have been provided for 50 percent of the Department of Education staff by 1990.
- A basic level of "hands-on" training will have been provided for all Department of Education staff by 1991.
- New staff will receive "hands-on" training.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE

Recommendation:

Provide guidelines, models and training for supervisory and administrative instructional staff in the use of technologies in the curriculum in elementary and secondary schools.

Outcomes:

- Instructional staffs in middle schools will have received standards, models and training information on the use of microcomputers in instruction by 1992.
- School-based models of instruction involving technology will have been developed for replication in other schools by 1994.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE

Recommendation:

Ensure the integration of technology into the content and delivery of current teacher preparation programs.

Outcomes:

- Teacher preparation program providers and Department of Education conference planners will have been encouraged to integrate technology into all state conferences and programs by 1991.
- Newer technology pilots involving higher education will have been implemented for planning and training for instructional improvement by 1994.

Recommendation:

Develop new, more appropriate certification requirements for library media specialists and teachers of computer courses and other technology-based instruction.

Outcomes:

- A study of certification requirements will have been made for library media specialists, teachers of computer courses, and other technology-based instruction by 1992.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE

Recommendation:

Provide state contracts for purchasing of educational technology equipment and arrange for state purchases of hardware and software when state assistance to school divisions is needed.

Outcomes:

- State contracts for microcomputers, printers, and peripheral computer equipment, and TVROs and satellite receive classrooms will have been developed and cleared for local school purchases by 1990.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE

Recommendation:

Equip each school with a microcomputer writing laboratory with a minimum of twenty-five work stations and a printer for every four microcomputers (microcomputer laptop models should be considered).

Outcomes:

- A study will have been conducted by 1994 to determine ways in which a microcomputer writing laboratory will be accommodated and used extensively in schools.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Recommendation:

Provide the following foundation level of microcomputer use and hardware support for all schools:

Each teacher, upon completion of 16 hours of training, should be provided a microcomputer configuration to consist of a two-disk drive microcomputer, printer, and LCD projection system. Microcomputers are to be used for teacher productivity and as a classroom tool. Teacher training in the use of newer technologies should be mandated by the Board of Education through the Standards of Quality.

Outcomes:

- 673 schools with sixth grade classes will have received 6,734 microcomputers and 1,521 printers for use with at-risk grade 6 students in mathematics, reading, and writing as a primary focus, and other uses including writing across the curriculum, teacher productivity, and special needs loan libraries by 1990.
- "Foundation" levels of technology hardware, software and teacher training included in the Standards of Quality and Standards for Accrediting Public Schools will have been funded and partly implemented by 1994.
- Schools with grades 7 and 8 will have received a microcomputer configuration by 1992.
- Elementary schools with fifth grade classes and with trained teachers will have received microcomputers and printers for use with at risk students and for other purposes such as writing across the curriculum, teacher productivity, and special needs loan libraries by 1992.
- All teachers in public schools are expected to have received training in the use of newer technologies by 1998.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Recommendation:

Equip each school to provide a student-to-microcomputer ratio of ten to one for the integration of computer technology into the curriculum. Microcomputers should have two disk drives or be networked.

Outcomes:

- Each school with a sixth grade class will have a student to computer ratio of ten to one by 1990.

(continued) ***Outcomes:***

- Each school with grades 5, 7, and 8 is expected to have a maximum student to computer ratio of ten to one in those grades by 1994.

Recommendation:

Provide each school with appropriate specialized software and peripheral computer hardware and adaptive devices for Vocational Education, Special Education, Science Education, and education of the gifted.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Outcomes:

- Vocational, special, and specialized education needs relative to adaptive and instruction technology will have been addressed in formative ways by 1994.

Recommendation:

Equip each library media center with four to six microcomputers for student use and at least one microcomputer for library management.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Outcomes:

- Schools will provide easy access to information for students through automated library media centers.
- Students will use computers in the library to enhance classroom activities and to extend their knowledge on an annual basis.

Recommendation:

Equip each school with a microcomputer for each block of fifty students that can be loaned to students and teachers for overnight and/or weekend use. Microcomputers should be used for personal productivity and support of instructional activities.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Outcomes:

- A computer loan program for overnight and weekend use will have been implemented in at least ten pilot schools by 1994.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Recommendation:

Equip each secondary school with a business education microcomputer laboratory with a minimum of twenty-five work stations and one printer for every four microcomputers.

Outcomes:

- Students will use up-to-date computer equipment in business education classes.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE/LEAs

Recommendation:

Equip each secondary school with a computer science microcomputer laboratory with a minimum of twenty-five work stations and one printer for every six microcomputers.

Outcomes:

- Students will have the opportunity to elect computer science courses in high school with up-to-date computers in preparation for college and employment.

Recommendation:

Provide the following foundation level of instructional media equipment for all schools:

Each *library media center* should have at least one of the following:

- **telephone**
- **35-mm camera**
- **Polaroid camera**
- **laminating machine**
- **modem**
- **overhead projector**

Each *library media center* should have the following:

- **two VHS videocassette recorder/players**
- **two slide projectors**
- **two audio cassette recorders**
- **two CD-ROM players**
- **four microform readers, including one with a printer**
- **three projection screens**
- **one portable public address system**
- **one photocopier (secondary schools)**
- **one level II laser videodisc player with a microcomputer**

Each *school and/or classroom* should have the following technology equipment:

- **overhead projector and screen (one per classroom)**
- **slide projector (one per 15 classrooms)**
- **audio cassette recorder (one per 4 classrooms)**
- **level III laser videodisc player (one per 8 classrooms)**
- **VHS videocassette recorder/player (one per 4 classrooms)**
- **VHS video camcorder (one per 15 classrooms)**
- **Color TV receiver/monitor at least 19 inches (one per 4 classrooms)**
- **CD audio player (one per 4 classrooms in elementary; one per 8 classrooms in secondary)**
- **telephone conferencing unit (one per school and administration location)**
- **telephone jack to facilitate networking (one per new and renovated school)**
- **opaque projector (one per floor in each school)**
- **large screen video projection system (one per school division)**
- **video editing system (one per school division)**

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

LEAs

Outcomes: *(continued)*

- Schools will be encouraged to use their own funds annually to purchase foundation-level equipment for library media centers.

- Due to varying needs, resources, and changing technology, the need for 16-mm film projectors, sound filmstrip projectors, and record players is decreasing; therefore a foundation level is not recommended for this equipment. Each building should provide adequate support for the preparation of teacher-made instructional materials. Library media centers should be equipped to set up individual transportation, and storage carts should be provided for all audiovisual equipment.

- Schools will be encouraged to use their own funds annually to purchase foundation-level technology equipment for their schools and classrooms.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE

Recommendation:

Adopt standards for microcomputer hardware and software for instructional as well as management purposes. These standards would allow the easy transfer of text, spreadsheets, and data throughout the public education system.

Outcomes:

- Adopted standards will permit schools to communicate with one another and will ensure a high quality of instructional and administrative computing.

Issue:

Equity

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE

Recommendation:

Increase the video collection in the Department of Education to ensure equitable distribution of resources to all schools, and to provide for video needs of the Department of Education staff.

Outcomes:

- The videotape collection in the Department of Education will have been increased to provide improved resources to small, rural schools and schools that do not have central or school collections.

- The videotape library will have been expanded to include current requested programs by Department of Education personnel.

Excellence

The information revolution places new demands on individuals, and on the knowledge and skills that they must possess to work and participate fully in society. Persons who do not adapt to technological changes may pay an enormous price, socially and economically. To avoid this it will be necessary to develop skills directed toward combining knowledge from a variety of fields. Knowledge gained is demonstrated in new techniques, in the ability to think critically, analyze and organize systems to solve problems, respond to changes, exert initiative, and in the student's ability to communicate effectively. Application of this knowledge will constantly change, as the skills and information bases needed for employment will rarely be those needed for the same job a few years later. Relearning and retraining will become the expected norm for many people throughout their lives.

Continuing education programs can be a vital component in adult education through video technologies, using interactive television as well as more traditional modes of broadcasting. Home reception, for example, gives learners of all ages access to instruction via video and audio technology.

Additionally, the production of smaller, cheaper, portable computers makes learning accessible to a variety of students. Homebound learners, who may be handicapped or chronically ill, can remain intellectually active through the use of computers and other new communication technologies.

Accessibility to education without constraints of time, schedule, and place can become a reality for all learners through the use of appropriate technology. Learning environments can be created to allow students and teachers to pace instruction according to individual learning styles. An increased sense of control over their own learning experiences results when students become active in determining what and how they learn. Technology, specifically the microcomputer, provides that sense of control.

"...PTAs will be pressing school boards to make technology more available to students. In places where the schools cannot afford technology, PTAs will be raising money for it."

Ann Kahn,
Past President
National PTA

"Excellence costs. But in the long run mediocrity costs far more."

National Commission on Excellence in Education, *A Nation at Risk*, 1983

"Distance learning has been validated as an effective way to deliver education and training to both rural and metropolitan areas. It is often the only way to offer advanced-level or specialized courses in small school divisions."

Virginia Technology Planning Committee, Commonwealth of Virginia

Teachers should become as familiar with the use of educational technology as they are with the chalkboard in their classrooms. Skilled master teachers who have received special training in the use of technology can assist with staff development for their colleagues. Adequate staff training at the local level is essential to the successful use of educational technology. Technology is most effective in teaching and learning when it is used as a tool to aid instruction and to deliver information, not as a separate program added to the curriculum.

The full potential for achieving excellence in education in the future will depend upon adequate funding for the use of technology in public schools today.

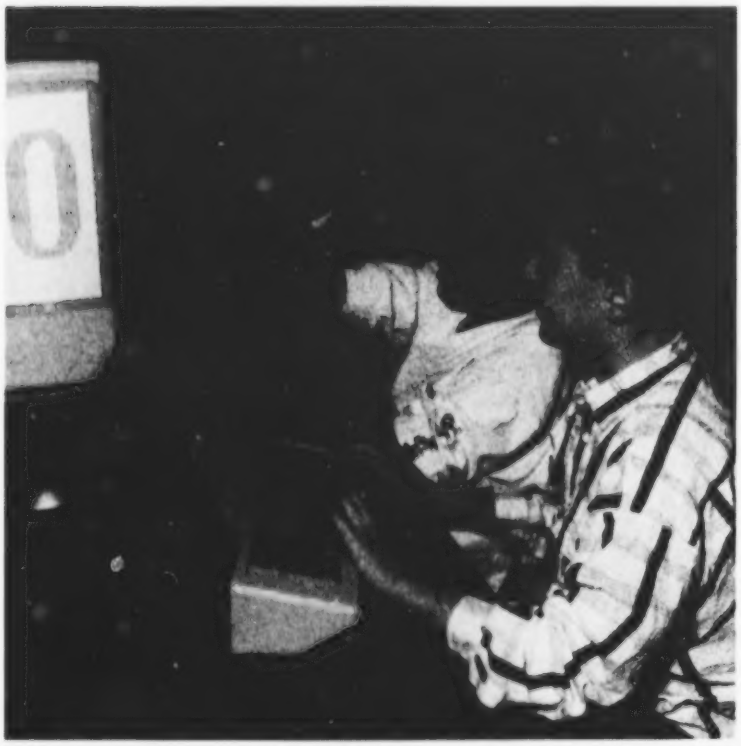


Photo courtesy of Chesterfield County Schools

Recommendation:

Provide training for teachers and administrators through statewide telecourses and teleconferences to promote the use of technology in all classrooms.

Outcomes:

- Teleconferences sponsored by the Department of Education will utilize multiple broadcast technologies selected according to delivery, population, and scheduling needs.
- The Department of Education will have participated in at least 20 national and state teleconferences for the purpose of training its own staff or local school staffs by 1992.
- Department of Education staff and local school staffs will have participated in 25 additional teleconferences by 1994.

Issue:

Excellence

Goal:

Provide transportable individualized, and lifelong learning

Responsible Entity:

DOE

Recommendation:

Use interactive technologies such as the videodisc and computers to individualize programs to enhance the development of basic skills and skills in problem solving and critical thinking.

Outcomes:

- Videodisc purchases by the Department of Education will have been used for staff development in local schools by 1994.

Issue:

Excellence

Goal:

Provide transportable individualized, and lifelong learning

Responsible Entity:

DOE/LEAs

Recommendation:

Develop demonstration take-home computer programs which encourage students and parents to engage in home learning.

Outcomes:

- Five pilot take-home computer programs developed by LEAs will be implemented by 1992.
- Exemplary take-home computer programs will be cited for excellence and recommended for replication in other schools.

Issue:

Excellence

Goal:

Provide transportable individualized, and lifelong learning

Responsible Entity:

DOE/LEAs

Issue:

Excellence

Goal:

Provide transportable individualized, and lifelong learning

Responsible Entity:

DOE/LEAs

Recommendation:

Investigate ways to take full advantage of newer transmission technologies, such as fiber optic cables, microwave, very small aperture terminals, cable television, and satellite delivery systems to improve the selection of appropriate technology and the quality and cost effectiveness of instructional programs and services.

Outcomes:

- Schools will have begun to use interactive technologies such as videodisc, computers and newer technologies such as fiber optic cables, small aperture terminals, and low band broadcast by 1994.

Issue:

Excellence

Goal:

Conduct planning and research

Responsible Entity:

DOE, higher education, business and industry

Recommendation:

Involve higher education, business and industry, and research institutes and agencies in planning and implementing pilot programs to test the effectiveness of educational technology. Review and support ongoing research to evaluate the emerging role of the teacher in a classroom influenced by technological developments.

Outcomes:

- Higher education, business and industry, research institutions, and agencies will have become involved in planning and implementation of pilot programs to further test the effectiveness of educational technology by 1994.

Issue:

Excellence

Goal:

Provide adequate funding for technology

Responsible Entity:

DOE, LEAs, Legislature, VPSA

Recommendation:

Provide additional funding through the Virginia Public School Authority for the purchase of technological equipment recommended for use in this plan.

Outcomes:

- Funding through the Literary Fund or the Virginia Public School Authority will be recommended to the Legislature for the purchase of additional satellite and computer hardware and for support of the Communication Automation Transition System (CATS) in the biennium 1990-1992.

Recommendation:

Support the evaluation of school division model programs, including simulations for improving education through instructional technology, by providing technical services and incentives.

Outcomes:

- Technical service and incentive programs will be developed to support the evaluation of two school division model technology programs by 1994.

Issue:

Excellence

Goal:

Conduct planning and research

Responsible Entity:

DOE

Recommendation:

Reevaluate the Six-Year Technology Plan and provide a progress report to the State Board of Education on a biennial basis.

Outcomes:

- The Six-Year Technology Plan will be evaluated and a report of progress submitted to the State Board of Education by 1992.
- A second evaluation, conducted by the committee that developed the plan, will be implemented by 1994.

Issue:

Excellence

Goal:

Conduct planning and research

Responsible Entity:

DOE

Recommendation:

Establish a mechanism for inventory of technology for use as a planning document.

Outcomes:

- An instrument to inventory technological equipment and systems will be developed to keep data correct.

Issue:

Excellence

Goal:

Conduct planning and research

Responsible Entity:

DOE/LEAs

Issue:

Excellence

Goal:

Provide adequate funding for technology

Responsible Entity:

DOE

Recommendation:

Support educational technology through joint funding efforts involving federal, state, local, and private sectors.

Outcomes:

- A system to identify funding sources will be developed and upgraded on a regular basis through 1994.

Issue:

Excellence

Goal:

Provide adequate funding for technology

Responsible Entity:

DOE

Recommendation:

Provide funding for a basic collection of instructional software to be housed in the Department of Education's Technology Examination and Training Center for review and evaluation by local schools and Department of Education personnel.

Outcomes:

- A more extensive collection of instructional software will be housed for review and evaluation by local schools in the Technology Examination and Training Center at the Department of Education by 1994.

Issue:

Excellence

Goal:

Provide adequate funding for technology

Responsible Entity:

DOE

Recommendation:

Provide an inservice training subsidy to each school division for all teachers in elementary, middle, and secondary schools who complete a sixteen-hour approved computer utilization program.

Outcomes:

- 673 schools with sixth grade classes will have received a small grant to help subsidize the purchase of software for remedial instruction in mathematics, reading, and writing by 1989.
- Schools with grades 6, 7, and 8 will have received an inservice training subsidy for teachers who complete sixteen hours of approved computer utilization programs by 1990.
- Schools with grade 5 will have received an inservice subsidy for teachers who complete a sixteen-hour approved computer utilization program by 1994.

Recommendation:

Provide funds for the replacement of Department of Education films with videotapes to promote more effective use of audio-visual resources and provide budget for acquisition and maintenance of an up-to-date collection of video programs not available to a large number of schools.

Outcomes:

- Replace all popular films in the Department of Education Library that can be purchased in videotape format by 1991.

Issue:

Excellence

Goal:

Provide adequate funding for technology

Responsible Entity:

DOE

Recommendation:

Develop state requirements in the Standards of Quality and the Standards for Accrediting Public Schools in Virginia for implementing "foundation" levels of technology hardware, software, and teacher, supervisor, and administrator inservice training.

Outcomes:

- Standards of Quality and/or Standards of Accreditation will be expanded to include technology foundation levels for local schools by 1994.

Issue:

Excellence

Goal:

Provide adequate funding for technology

Responsible Entity:

DOE

Recommendation:

Expand Department of Education's staff development teleconference program by providing regional "train the trainer" workshops, college telecourses, and seminars to include noncertificated personnel.

Outcomes:

- Department of Education staff development teleconference programs will have been expanded to provide regional "train the trainer" workshops, telecourses, and seminars for noncertificated personnel by 1992.

Issue:

Excellence

Goal:

Provide training for instructional staff

Responsible Entity:

DOE

Issue:

Excellence

Goal:

Provide training for instructional staff

Responsible Entity:

DOE

Recommendation:

Develop and implement model "train the trainer" middle school software utilization workshops focusing on remediation in mathematics, reading comprehension, and writing in major geographic areas of the state.

Outcomes:

- Seven regional "train the trainer" workshops will be presented to middle school teachers in the areas of reading, writing, and mathematics during the spring of 1989.
- Middle school teachers will participate in local inservice training programs during 1989-90.
- Middle school teachers will be prepared to implement the Governor's Technology Initiative in the sixth grade by the fall of 1989.

Issue:

Excellence

Goal:

Provide training for instructional staff

Responsible Entity:

DOE

Recommendation:

Provide a training program for Department of Education personnel to enable them to learn to operate and evaluate traditional and newer technologies for personal productivity and school applications.

Outcomes:

- One-half of the Department of Education staff will have learned to operate and evaluate traditional and newer technologies for personal productivity and school applications by 1991.
- The second half of the Department of Education staff will have learned to operate and evaluate traditional and newer technologies by 1992.

Recommendation:

Recognize educators who excel in the use of technology.

Outcomes:

- A program to recognize educators who excel in the use of technology will have been developed by 1992.

Issue:

Excellence

Goal:

Strengthen partnerships

Responsible Entity:

DOE

Recommendation:

Investigate ways to provide teachers with experiences in the use of technology by business and industry for the purpose of credit and/or certificate renewal.

Outcomes:

- Research will be conducted with business and industry to develop partnerships and assist teachers who want to gain credit for on-the-job training.

Issue:

Excellence

Goal:

Strengthen partnerships

Responsible Entity:

DOE

Recommendation:

Provide educational technology planning and implementation grants and other incentives to encourage the use of technology.

Outcomes:

- The use of technology by middle school teachers will have been encouraged through project grants and other incentives for special programs by 1994.
- Incentives and grants will have been awarded to local school divisions for exemplary programs using technology, especially in the middle schools, by 1992.

Issue:

Excellence

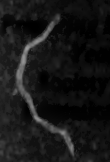
Goal:

Provide adequate funding for technology

Responsible Entity:

DOE

"Technology will help bring the world much closer to all classrooms. The learning environment will not be the classroom but the world."



"As a critical element of school restructuring, all schools should install a computer and adequate software on every teacher's desk by 1997."

Connections

Providing a method for linking learners in the state to each other and to students in the nation and the world promotes equity and excellence in education. Online communication systems provide instantaneous access to information through modems, computers, and telephone lines. This access can be enhanced through video technologies. Information databases stored in computers can be retrieved quickly in geographical locations far removed from storage sites. Electronic mail and bulletin board systems provide worldwide connections through subscriptions and identification codes.

A vital part of the Communications/Automation Transition System (CATS) is a communications network to connect electronically the Department of Education and all school divisions. This shared network is known as Virginia Net (VA.NET). Automated, standardized databases within this network will provide school administrators with student information, financial management data, and personnel information. A number of school libraries in Virginia are already linked through electronic networks with public libraries to share cataloging of materials and publications and to collect information. SpecialNet links state educators of handicapped students through electronic mail. Networks extended to Virginia also provide a variety of programs and services of interest to schools. Satellite programs developed in cooperation with other states offer courses in various subjects to consortium members on a national and international basis. The Satellite Educational Resources Consortium (SERC), a national satellite consortium, for example, offers courses to eighteen states, including Virginia, and transmits Virginia-produced science seminars from the Thomas Jefferson High School for Science and Technology in Fairfax County to the eighteen member states. Virginia has been a member of the Minnesota Educational Computing Corporation (MECC) for a number of years. The membership allows school divisions the option to purchase associate memberships under the state's institutional membership. The KIDS NETWORK (KIDS NET) is an example of a

network students are beginning to use to communicate with students in other schools, states, and countries. University-based electronic networks are used by some teachers and college professors to maintain an information exchange program.

Hierarchical networks must be integrated and compatible to promote accessibility and to provide optimal learning opportunities to all users. Standardization provides a framework for merging a number of networks into single entities and increasing access for large numbers of students and programs.

However, full network usage requires trained users. Foundation levels for technology training should be established for staff support to assure maximum linkage for minimum cost. Staff development is a necessary component for network usability. Networks can be used to link students and teachers to schools and businesses and to offer mutually beneficial relationships to employees and schools. Through electronic networks and shared databases, consortia of schools, businesses, and higher education are provided instant access to vital research information.

Alternative models for delivering instruction to students with special learning needs can be provided through electronic networks. Handicapped, gifted, or homebound students can be linked to their peers and continue their learning in a variety of environments. Students who do not benefit from traditional classroom instruction can discover new avenues to learning through networks and technology.

The benefits of linking learners to information must be documented. Research is continually needed to guide educational decisions. Questions concerning the cost/benefit/learning ratio of technology-aided instruction to more traditional methods of instruction must be addressed on an ongoing basis. Further research and pilot programs will provide answers to many of these questions. National and state research literature has verified that increased learning occurs when technology is used. Virginia needs more research studies, however, to provide answers to legislators who are responsible for appropriating funds for technology and to educational administrators and teachers who decide how to use the funds. Informed decisions based upon valid, reliable research will promote public confidence in and support for educational technology.

"Virginia should exploit the full potential of new technology as a major part of its effort to upgrade education at all levels."

Toward a New Dominion: Choices for Virginians.
Governor's Commission on Virginia's Future, 1984

"Technology can be used to provide programs for schools with vast differences in student achievement and in education opportunities."

Governor's Commission on Excellence in Education, 1986

Issue:

Connections

Goal:

Merge networks for learning

Responsible Entity:

DOE, LEAs, business and industry

Recommendation:

Pursue additional partnerships and promote existing partnerships between the private sector and education to encourage the use of experience-based learning where students and/or teachers can develop insights into phenomena that cannot be directly seen or easily observed in traditional classrooms.

Outcomes:

- At least two pilot business and industry programs to encourage experience-based learning in fully-equipped environments will have been implemented by 1993.
- Two additional pilots will have been implemented by 1994.

Issue:

Connections

Goal:

Merge networks for learning

Responsible Entity:

DOE and other state agencies

Recommendation:

Work with the Departments of Information Technology, and General Services and Supply, higher education, and other agencies to systematically plan for integrating existing telecommunication systems into larger hierarchical systems for improving service and cost and controlling duplication.

Outcomes:

- The Department of Education will have participated in discussions involving the Council for Information Management, the Department of Information Technology, the Virginia Public Telecommunications Board, and state agencies to systematically plan for the integration and combination of hierarchical video, audio, and data systems in order to improve costs and services and eliminate duplication by 1994.

Issue:

Connections

Goal:

Merge networks for learning

Responsible Entity:

DOE

Recommendation:

Develop a study to evaluate the use of multiple technologies in all library media programs, and establish statewide guidelines for the sharing of media resources by school divisions.

Outcomes:

- A study will have been conducted by 1992 to evaluate the management of multiple technologies in all library media programs.

Recommendations:

Provide ongoing updates of correlations of the Standards of Learning to instructional television, satellite, videodisc, and computer software lessons/programs.

Outcomes:

- Correlations of instructional TV with the Standards of Learning was completed in 1988. Updates must be scheduled on a regular basis.
- Correlations of computer software in the areas of math, reading, and writing with the Standards of Learning are being requested from distributors to be shared periodically with schools.

Issue:

Connections

Goal:

Provide training for instructional staff

Responsible Entity:

DOE

Recommendations:

Provide updates on curriculum applications of technology to local school divisions, appropriate Department of Education staff, and professional organizations.

Outcomes:

- Public schools will have reports on effective uses of computers and other technologies from the Department of Education in subject areas in the curriculum to help achieve instructional objectives by 1994.

Issue:

Connections

Goal:

Provide training for instructional staff

Responsible Entity:

DOE

Recommendations:

Include technology sessions and/or employ the use of state-of-the-art technology in state conferences and meetings sponsored by the Department of Education.

Outcomes:

- State-of-the-art technology will have been demonstrated in state-sponsored conferences and meetings by 1994.

Issue:

Connections

Goal:

Provide training for instructional staff

Responsible Entity:

DOE

Issue:

Connections

Goal:

Provide training for instructional staff

Responsible Entity:

DOE

Recommendation:

Provide, on a systematic basis, ongoing school-based inservice including hands-on training in the use of origination and receive satellite technologies.

Outcomes:

- Satellite technology hands-on instruction will have been provided for new facilitators and system operators by 1992.
- Technicians in the Electronic Classrooms will have been trained to use specialized production equipment by 1990.
- Electronic Classroom teachers will have received at least two training sessions to improve the quality of instruction by 1989.
- Additional training will be scheduled as needed and requested by teachers, technicians, and teacher aides.

Issue:

Connections

Goal:

Provide training for instructional staff

Responsible Entity:

DOE

Recommendation:

Develop and implement staff development programs to offer intensive workshops to instruct library media specialists in implementing library media services using newer technologies.

Outcomes:

- The Department of Education will provide training through teleconferences and print to library media specialists to help prepare them for new and additional technological responsibilities.

Issue:

Connections

Goal:

Strengthen partnerships

Responsible Entity:

DOE, LEAs, business and industry

Recommendation:

Promote and assist the implementation of statewide and regional technology partnerships with business and industry.

Outcomes:

- Partnerships with business and industry engaged in technology application will have been developed in cooperation with local schools and Department of Education supervisors by 1994.

Recommendation:

Upgrade Standards for Accreditation for elementary librarians to match middle and secondary school standards.

Outcomes:

- A recommendation will have been submitted to the Board of Education to include a revision in the Standards for Accreditation for elementary librarians by 1989.

Issue:

Connections

Goal:

Establish foundation levels and standards

Responsible Entity:

DOE, Legislature

Recommendation:

Develop online library networks to facilitate equitable sharing of instructional materials.

Outcomes:

- Online library networks to facilitate equitable sharing of instructional materials will have been implemented in pilot schools by 1994.

Issue:

Connections

Goal:

Merge networks for learning

Responsible Entity:

DOE/LEAs

Recommendation:

Establish a council to provide overall direction and coordination of educational applications of technology within the Department of Education.

Outcomes:

- A council to help provide technology leadership to curriculum and instruction personnel in the Department of Education and to advise the Board on technology standards will be operational by 1990.

Issue:

Connections

Goal:

Provide training for instructional staff

Responsible Entity:

DOE

Issue:

Connections

Goal:

Strengthen partnerships

Responsible Entity:

DOE

Recommendation:

Investigate the development of a foundation to provide for private sector support of technology projects in schools.

Outcomes:

- A group of lay and professional people will be assembled to investigate the desirability of a foundation for technology projects to benefit schools and the school community.

Issue:

Connections

Goal:

Strengthen partnerships

Responsible Entity:

DOE

Recommendation:

Link select businesses and industries electronically via a school telecommunications system such as satellite, cable, ITFS, and computer networks for exchanging information.

Outcomes:

- Utilization of the expertise and teaching resources of business and industry will be made possible through a variety of distribution technologies linking the business and schools electronically.

Issue:

Connections

Goal:

Strengthen partnerships

Responsible Entity:

DOE

Recommendation:

Explore opportunities for the development of models for meaningful learning by students through problem-solving experiences, in cooperation with business and industry.

Outcomes:

- Models for meaningful learning by students will have been identified and shared with local schools by 1994.

Recommendation:

Assist with determination of appropriate applications of locally available technologies that complement and "connect to" regional and state systems with similar goals and target populations.

Outcomes:

- The Department of Education and the Six-Year Technology Plan Committee will plan with the Council for Information Management, PTV Stations, Virginia Public Telecommunications Board, and other statewide organizations to integrate and link distribution systems for video, voice, and data.

Issue:

Connections

Goal:

Strengthen partnerships

Responsible Entity:

DOE

Recommendation:

Continue to engage in cooperative research with local school divisions and other regional and national efforts to learn, contribute to, and profit from educational technology research funded through other sources.

Outcomes:

- Knowledge of technology in education will be increased through cooperative ventures with local, state, and national study groups.

Issue:

Connections

Goal:

Conduct planning and research

Responsible Entity:

DOE, LEAs, research organizations

Recommendation:

Develop a communications network with school divisions to support the electronic transfer of data.

Outcomes:

- In addition to providing a facility for transmitting information, the network will provide access to significant data sources such as the Code of Virginia, the legislative bill status system, national information services, statewide calendar of events, conference/workshop registration systems, specifications for educational standards, and due dates for reports required by the Department of Education and other agencies.

Issue:

Connections

Goal:

Merge networks for learning

Responsible Entity:

DOE

Issue:

Connections

Goal:

Merge networks for learning

Responsible Entity:

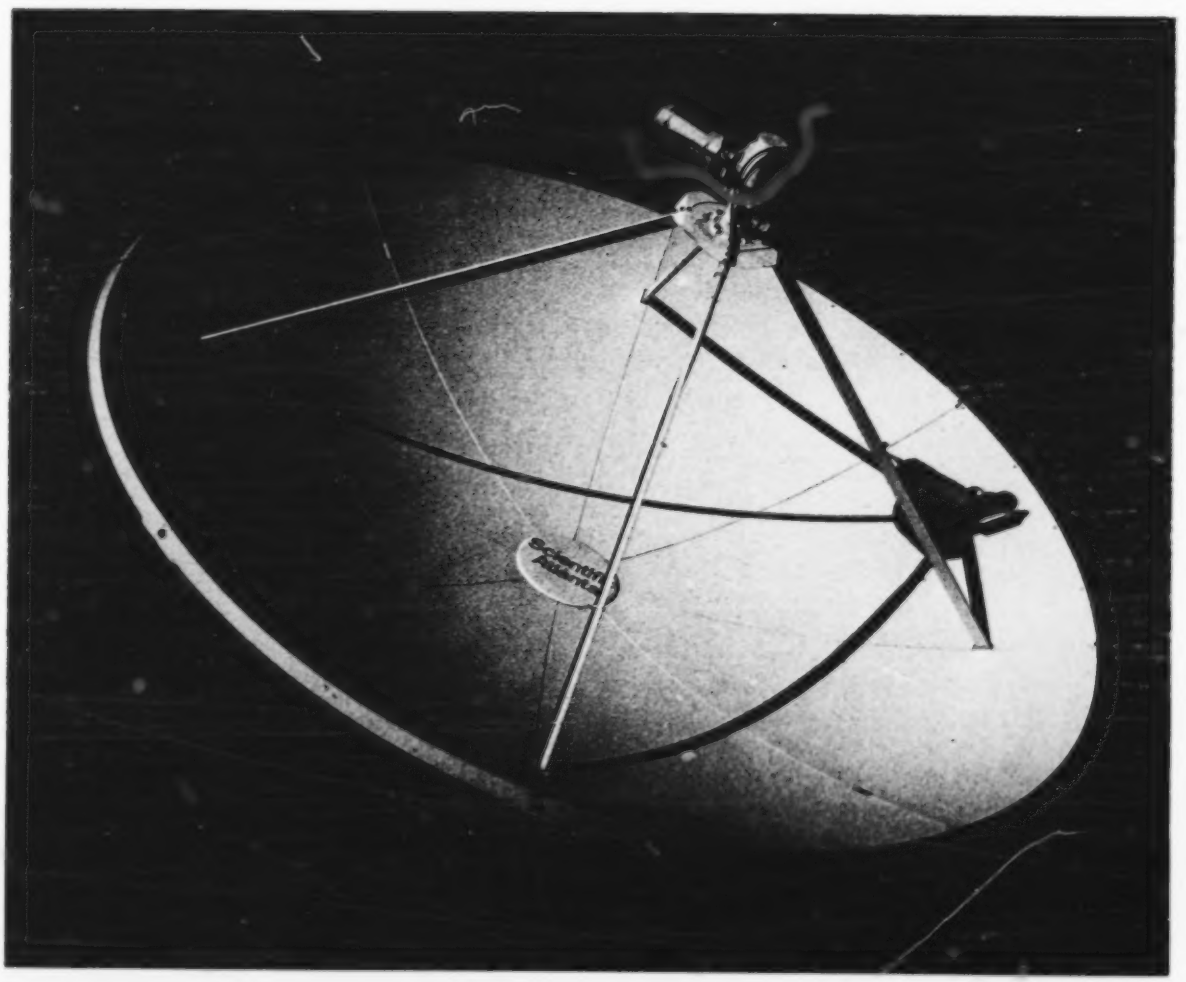
DOE

Recommendation:

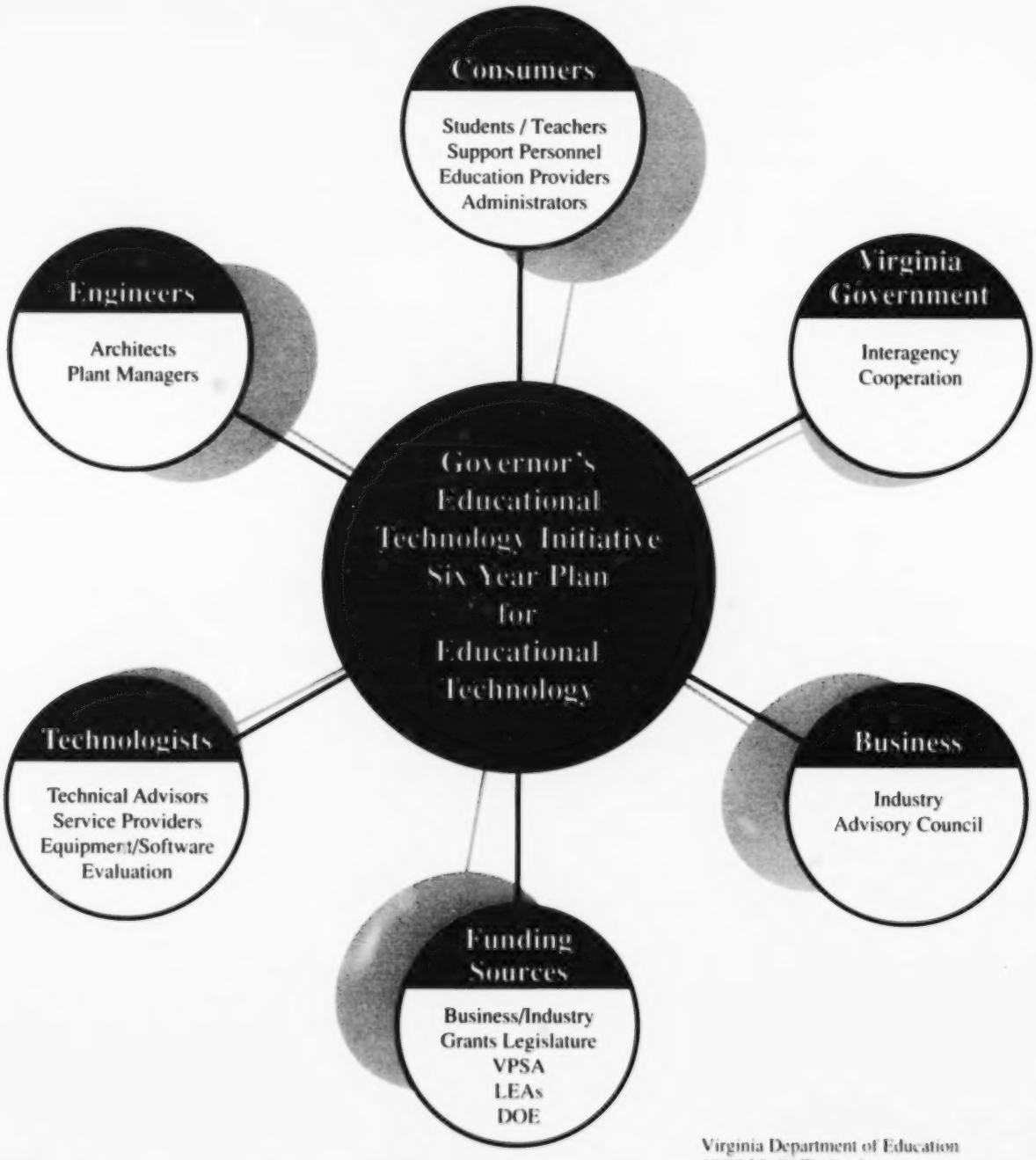
Participate in national consortia and/or join organizations for the purpose of negotiating state cost-beneficial usage rights for computer software, telecourses, inservice training, and instructional materials.

Outcomes:

- The Department of Education will participate in national consortia for the purpose of negotiating state cost beneficial usage rights for computer software, teleconferences, telecourses, and instructional materials requested by schools.



Educational Technology Model



Virginia Department of Education
10/89 Media/Technology

Six-Year Planning Committee

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Norfolk City Schools	*John C. Alluisi*
Hanover County Schools	*Dr. R. Wesley Batten*
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State Agency Task Force

Office of the Secretary of Education
Department of the Treasury
Department of Planning and Budget
Department of General Services
Department of Information Technology
Department of Education

Boards and Councils

Council for Information Management
Virginia Public Telecommunications Board
State Board of Education
Local School Boards
Boards of Supervisors and City Councils

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